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ABSTRACT

Three short articles about mathematics and science braille are provided for braille transcribers and teachers of the visually handicapped. The first article discusses the differences between the rules for English textbook format and the Nemeth Braille Code (for mathematics, science, and notation) format in transcribing the mathematical section of a standardized test. Important points to remember are listed, and examples of mathematics problems in braille are presented. The second article deals with identifying types of fractions and presents examples of simple, complex, and hypercomplex fractions. The third article clarifies common misunderstandings concerning when to use Nemeth Code as opposed to the English Braille Code in transcribing texts. Specific examples are given of instances when Nemeth Code should be used as the primary code. (LH)

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MATHEMATICS AND SCIENCE BRAILLE

A Perennial Dilemma — The Standardized Test

Doris Cohn, Vice Chairman

How many times have you been handed the mathematical section of a standardized test to transcribe without instructions as to format? You ask, "Who is doing the literary arts and what format are they following?" The silence is deafening, or possibly the answer is, "Two other transcribers will be working on the transcription, but I'm not sure who. Please just get it done fast." Another common practice is to have the Nemeth transcriber complete the entire test because of the arithmetic and science.

As you pre-structure, the differences between the rules for textbook format and Nemeth Code format become apparent. Consider a few of the most common problems. Instructions to non-spatial itemized materials: Nemeth Code begins in cell 5, run over to cell 3; Textbook Format is blocked in cell 5. Itemized material with subdivisions: Nemeth Code requires that the subdivision numbers or letters begin in cell 3, run over in cell 5; TBF uses the step method with runover indented 4 cells from the beginning of the particular division. There are also inconsistencies in the presentation of displayed material. If Textbook Format is selected should upper case numerals for the item number be used in the Nemeth portions? This author has also seen Nemeth numerals in both the language arts and mathematical sections of the braille edition.

The Code in section 4(b) speaks of "partially technical works." This can be interpreted to include standardized tests. I would therefore suggest that Nemeth Code format be followed in all mathematical and science sections of standardized tests.

Now that your first dilemma is solved, what format have you selected to present the questions and answers? Keep in mind that publishers use many innovative methods when listing answers: vertical, horizontal, columns, to the right of the question, in boxes, or even change of type font. Uniformity should always be your first consideration. One definite benefit to the student would include listing *all* answer choices vertically. The examples below reflect a suggested guide which can be followed for most standardized tests.

Important Points To Remember

1. Transcriber's Note Page
   a. Each volume containing technical material must have a transcriber's note at the beginning stating that the work was transcribed in the Nemeth Code, giving the year the Code was adopted.
   b. A statement that in print the answers are listed horizontally, vertically, in columns, etc. The braille edition will list all answers vertically starting in cell 3 and run over to cell 5.
2. Format
   a. Item numbers in cell 1, followed by the question, run over to cell 5.
   b. List all answer choices vertically beginning in cell 3, run over to cell 5.
   c. Displayed material begins in cell 7, run over to cell 9.
   d. Blank line between problems.
   e. Never transcribe the question and answers on separate braille pages unless necessitated by the length of the problem. The entire problem would require more than 25 lines.

Examples

203. Which statement below is *false*?
   a) The product of an odd and an even number is even.
   b) The sum of two odd numbers is an odd number.

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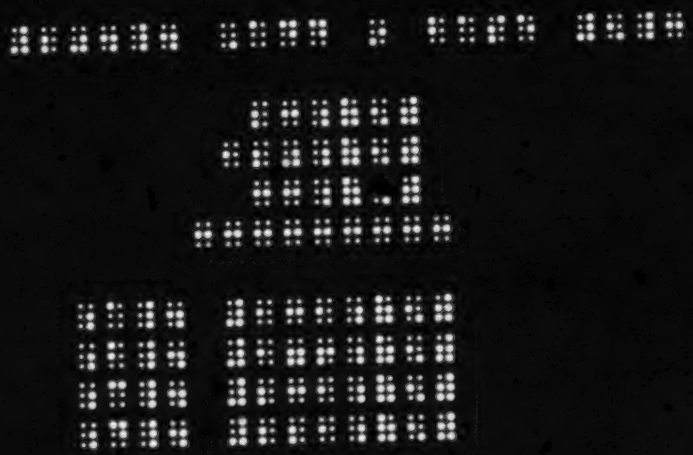
c) The product of two even numbers is even.
d) The sum of an odd and an even number is odd.

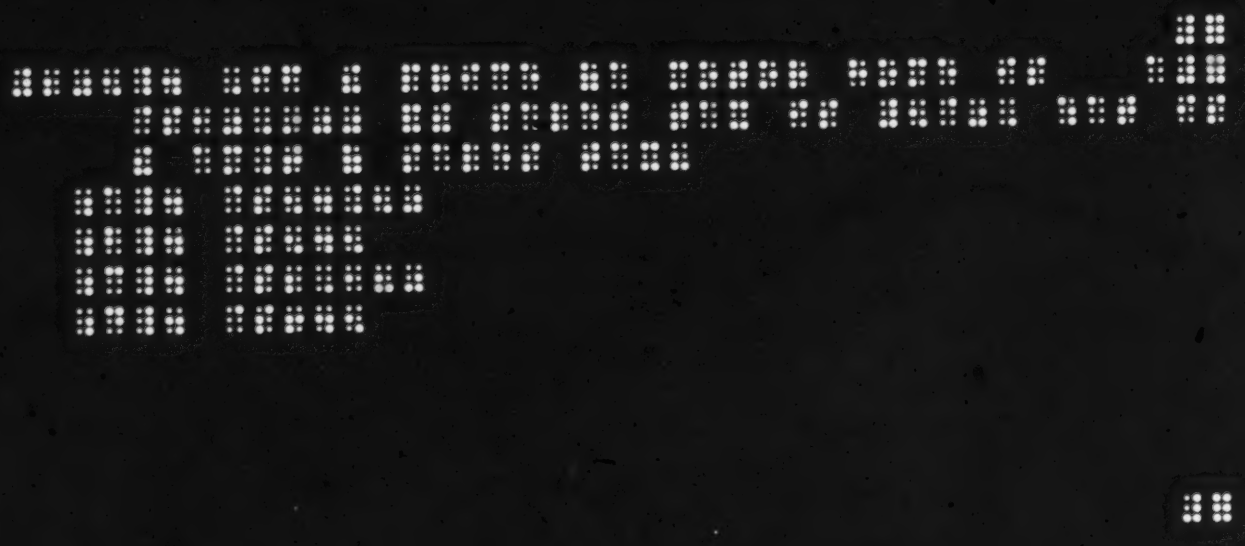
204. Add in base 5. $23_{(5)}$
$120_{(5)}$
$33_{(5)}$

a) $131_{(5)}$ b) $176_{(5)}$ c) $231_{(5)}$ d) $221_{(5)}$



205. If the price of a motor home is $10,900 and the sales tax is 5%, what is the amount of sales tax?

a) $54.50 c) $2,180
b) $545 d) $645



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Back to Basics

Von E. Eulert, Chairman

Many transcribers are experiencing difficulties in identifying types of fractions. Sometimes a "simple" fraction can look very complicated or a "complex" one seem quite simple. Review Rule XII in the Code for definitions of "simple", "complex" and "hypercomplex" fractions. Consider the number and position of fraction lines in making the decision. *Caution:* Just because a fraction does not require a fraction indicator, such as 3/4, does not mean it is not considered in counting levels of fractions.

Below are some examples:

1. $$\frac{-(-3e+5d) \pm \sqrt{(5d-3e)^2-4(-15de)}}{2}$$

Although this fraction is long and complicated, it is still a "simple" fraction according to the Code. The print line of the radical must not be counted as a fraction line.

2. $$\int_{-1}^{1} \frac{z\,dz}{(z^2+1)^{3/2}}$$

A "simple" fraction. "3/2" is at the superscript level so does not "count".

3. $$\int \frac{-\frac{1}{z^2}\,dz}{\frac{1}{z}\sqrt{\frac{2}{z}-\frac{1}{z^2}}}$$

A "complex" fraction. The fact that 2 of the simple fractions are enclosed in a radical has no bearing on the decision, they are still simple fractions in the denominator and have the same standing as the fraction in the numerator.

4. $$\left[\frac{x^{3/2}}{3/2}\right]_0^1$$

A "complex" fraction. Although the fraction in the numerator is at the superscript level, the one in the denominator is at the base level. Note that the fraction indicators are not used for either of these fractions but the fact remains that this is still a "complex" fraction.

5. $$\int \frac{dv}{\frac{2 \sin \frac{1}{2} \cos^2 \frac{1}{2} v}{\cos \frac{1}{2} v}}$$

A "hypercomplex" fraction. This is transcribed in the "preferred method" as shown in the Code.

We will use example 5 to demonstrate a suggested method for determining the number of dots-six to use before the fraction indicators and fraction lines. First, you must determine which line is the "main" fraction line. In this example, the decision is easy. The "main" fraction line is darker in print than the others are. In some examples the "main" line is longer. In others there is no discernable difference but you can usually determine the importance by context, even if you do not know mathematics.

If you are having difficulties in transcribing hypercomplex fractions, remembering how many of dots to use before the indicators and lines, try marking the lines in pencil with checks or numerals. Below is example 5 with check marks to indicate the number of dots to use. Compare this with the transcription shown above.

$$\int \frac{dv}{\frac{2 \sin \frac{1}{2} \cos^2 \frac{1}{2} v}{\cos \frac{1}{2} v}}$$

In the print there are 2 check marks beside the hypercomplex fraction line. If you will refer back to the braille, you will see 2 dots preceding both fraction indicators enclosing this fraction and before the hypercomplex fraction line. There is one check mark before the complex fraction line in print and one dot six before each fraction indicator and before the fraction line. The simple fractions have no checks in print and no dots in braille. As you become more experienced in transcribing hypercomplex fractions, you will find it unnecessary to use this crutch, but it is helpful for a beginner or student.

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Use the Right Code

Von E. Eulert, Chairman

Some books are being transcribed in the wrong code due to some misunderstanding of the requirements. Perhaps a review of Section 4 of the *Nemeth Braille Code for Mathematics and Science Notation* will help. The Nemeth Code divides texts into three categories as follows:

a. *Non-technical* (absence of mathematical or scientific notation) Transcribe in English Braille.
b. *Partially technical* (occasional mathematical or scientific notation) This will be discussed later.
c. *Technical works* (consists of mathematical and scientific notation throughout) Transcribe in Nemeth Code or Computer Notation as required by the content.

Let's explore "b." more thoroughly. The English braille code is your primary code but there may be instances where the reader is asked to work problems, manipulate the notation in some manner, or the material may be such that it cannot be transcribed in English braille. In that case, insert a transcriber's note before the material affected stating the change of code and have a Nemeth transcriber transcribe that material. If the material consists of an example, you may indicate in the transcriber's note that just that example is in Nemeth notation and then resume English braille with no further notes.

As an example, you are brailling a library book about guns. There are many numbers in it showing bore size, weight or size of shot, muzzle velocity, etc. All of these can be transcribed in English braille. Remember, your reader of library books may not be familiar with anything other than English braille. He may have lost his sight after completing formal education or may be older and never have learned Nemeth code. Caution: We are speaking of a general work such as the history of guns, not of a technical work to be used for the manufacture of guns where the mathematical notation would be manipulated by the reader.

Another example would be a general science or biological science textbook where most of it contains very little mathematical notation. There may be a few sections on chemistry, physics, etc. where it makes sense to transcribe those sections in Nemeth notation. In that case, the transcriber would use English braille as his primary code but change to Nemeth code for these sections. A transcriber's note precedes this material, alerting the reader to the change of Code. A Nemeth transcriber should transcribe the whole chapter or section and end with a transcriber's note stating that English braille is resumed.

When you use Nemeth notation in a work which has English braille as the primary code, you must have a Special Symbols page in each volume in which such symbols appear, listing all the Nemeth symbols used in that volume.

It is a waste of a "scarce commodity" for a Nemeth transcriber to be required to transcribe a book, which should be in English braille, just because there are some pictures, charts, tables and numbers included. Since only Nemeth transcribers are likely to read this column, please remind your assignments chairman of the above.

Now, let's carry this idea even farther into computer notation. Many lower grade texts contain many "flowcharts" to teach methods for solving simple problems. They are not meant to teach computer science, merely to show a logical progression of actions required to reach a solution. Do *not* transcribe in computer notation. Draw in the boxes around the entries, draw the arrows and use Nemeth notation. These are usually very simple "tunnel charts". The same technique is used for organizational charts illustrating the flow of authority in an organization.

When you are transcribing a textbook which has a section or sections actually teaching the use of computers (most often in algebra texts), your primary code for the text is Nemeth notation. You will need a transcriber's note as explained for changing from English braille to Nemeth. While you are under the influence of that note your primary code is computer notation. Do not revert to Nemeth notation unless there is no way to do it in computer notation. If Nemeth notation must be used, it must be enclosed in Nemeth indicators according to the rules of the computer code. All computer symbols used must be listed on the Special Symbols page of each volume in which they are used. The reference to the code being used must be added to the one for the Nemeth code on the Transcriber's Notes page.

Owner's manuals or other instructional material for the use of electronic calculators should be in Nemeth notation as the primary code. Even most manuals for programmable calculators are primarily Nemeth notation. There may be a few programs and/or flow charts, but the bulk of the material is mathematical. Many users of these calculators are not familiar with the computer notation and do not want to take the time to learn it. All they want to do is to learn how to use the calculator.

If some programs or flow charts must be put into computer notation, they must be preceded and followed by the usual transcriber's note and the symbols listed on the symbols page. Of course computer manuals and textbooks must be transcribed with computer notation as the primary code.